

REMARKS

The amendment to claim 1 is supported by claims 4 and 17. Claims 4, 17, 23, 27 and 29 have been cancelled. The amendment to claims 18, 19, 28, 30 and 31 corrects dependencies. The amendment to claim 20 is supported by claims 23 and 27. The amendment to claim 24 is supported by claims 20 and 29. New claims 38 and 39 are supported by claims 20 and 21. No new matter has been added. Upon entry of this amendment, claims 1-3, 5-13, 18-22, 24, 28, 30, 31, 38 and 39 are present and active in the application.

Applicants would like to thank Examiner Staicovici for the courteous and helpful discussion held with applicants' representatives on 11 October 2006. During this discussion, the present amendments to the claims were discussed, and it was indicated that they would advance prosecution of the applications.

C/C composites are considerably stronger and lighter than steel. Such materials increase in strength with increasing heat treatment and resist thermal shock caused by rapid temperature change. However, they suffer from a number of drawbacks including poor oxidation resistance, highly variable wear rates and coefficient of friction, and costly manufacturing. Carbon fibers reinforcing a boron nitride matrix (C/BN composites) have the potential to overcome some of the shortcomings of C/C composites. Prior preparations of these composites, such as those described in U.S. Pat. No. 5,399,377, do not have acceptable heat capacity and thermal conductivity to substitute for C/C composites in aircraft brakes, due to low density. The present invention mitigates this problem.

The present invention includes forming a mixture comprising borazine oligomer, and subjecting the mixture to a first heating. The first heating is at 60 °C to 80 °C, and at a pressure of at least 0.5 MPa. The composite material has a boron nitride matrix with superior density, providing a composite with superior properties. As now claimed, the composites have a density of at least 1.62 g/cc.

The rejections of the claims under 35 U.S.C. 103 over Economy et al. in view of Spain et al., optionally in combination with Lavasserie et al., and/or Parlier et al., are respectfully traversed. Economy et al. describes a maximum density for carbon fiber reinforced boron nitride matrix (C/BN composites) of 1.61 g/cc.

Economy et al. describe borazine oligomer and boron nitride composite materials. Borazine oligomer is prepared by heating borazine at 70 °C (col. 3, lines 13-15). The preparation of the composites is only described in the examples: the oligomeric precursor is impregnated into a fiber bundle, and then the matrix is partially stabilized in shape through further polymerization in temperature ranges of 50 °C to 90 °C for two days under a nitrogen atmosphere in an oven (col. 4, lines 24-35). Next, thermal processing is conducted under non-oxidative crosslinking conditions to a final temperature of 400 °C supplied by a Carver hot-press, with molding pressures gradually applied up to 5 ksi (col. 4, lines 38-45). Examples 8-12, 18 and 19 describe C/BN composites, and examples 13-17 describe boron nitride matrix composites using ceramic fibers. The greatest density achieved for C/BN composites, even with multiple impregnations, is 1.61 g/cc (col. 5, lines 44-45). There is no suggestion of greater densities; density is a property of the composites which the reference seeks to maximize.

Spain et al. describes composite performs and method for their manufacture. There is no description of C/BN composites or their densities. Lavasserie et al. and Parlier et al. have been cited for elements of dependent claims.

As claimed, the present invention specifies a maximum density of 1.62 g/cc. Economy et al. describes a maximum density for C/BN composites of 1.61 g/cc; density is a property of the composites which Economy et al. seeks to maximize. Spain et al. does not describe C/BN composites or their densities. Lavasserie et al. and Parlier et al. have been cited for elements of dependent claims. Accordingly, applicants submit that the claimed invention is not obvious over the applied references. Withdrawal of these grounds of rejection is respectfully requested.

Applicants submit that the present application is now in condition for allowance.
Early notice of such action is earnestly solicited.

Respectfully submitted,



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